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Two new Neotropical genera of Miracinae (Hymenoptera, Braconidae) with unusual metasomal morphology

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Abstract

Two morphologically unusual new neotropical genera of Miracinae, *Paramomirax* Whitfield and Fernandez-Triana, and *Fusimirax* Whitfield and Fernandez-Triana, are here proposed and described. The two new genera differ strikingly from previously known Miracinae in having completely different patterns of desclerotization of the anterior metasomal tergites. *Paramomirax*, so far known only from paramo vegetation at high elevation in Colombia, is represented by *P. peckorum* Whitfield, new species. *Fusimirax*, so far known only from lower elevation forests in the Dominican Republic, is described from three species, *F. masneri* Whitfield & Fernandez-Triana, new species, *F. robusta* Whitfield, new species, and *F. gracilis*, Whitfield, new species. None of the four species has any recorded hosts yet, although all previous Miracinae with known hosts attack leaf-mining and bark-mining moth larvae.

Keywords

Colombia, Dominican Republic, *Fusimirax*, leaf-mining Lepidoptera, paramo, *Paramomirax*

Introduction

The Miracinae are, based on described species, a small subfamily of Braconidae classified within the "microgastroid" lineage, which is now well established as a monophyletic lineage based on both morphological and molecular, including genome-scale, data

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(Whitfield and Mason 1994; Whitfield 1997a; Dowton and Austin 1998; Murphy et al. 2008; Sharanowski et al. 2021; Jasso-Martinez et al. 2022). Taxonomic studies on the subfamily have been very limited, largely due to their small body size and fragile metasomal morphology that requires special treatment to avoid collapsing for effective examination of their morphology. As a result, currently around 75 species have been described worldwide (Yu et al. 2016; Ghramh et al. 2019; Slater-Baker et al. 2022, 2025; Ranjith et al. 2023; Liu and Polaszek 2024a, b, c, in press), in three recognized genera (one of which, *Centistidea*, is sometimes treated as a synonym or subgenus of *Mirax* Haliday (Whitfield 1997b; Slater-Baker et al. 2022, 2025), or recognized as distinct (Gadallah et al. 2022; Ranjith et al. 2023; Liu and Polaszek 2024a, b, c, in press)). It has long been clear that additional genera remain to be described and, based on specimens we have seen in collections, the actual species richness of the subfamily will surely amount to several hundreds of species. Further support to this is provided by the Barcode of Life Data System (https://v4.boldsystems.org/index.php) which as of December 2024, contained some 2,000 DNA barcode sequences of Miracinae from samples from all over the world, representing some 300 Barcode Index Numbers (BINs), which very loosely correspond to potential species (https://v4.boldsystems.org/index.php/Taxbrowser_Taxonpage?taxon=MIracinae&searchTax=Search+Taxonomy).

The currently recognized genera (*Centistidea* Rohwer, *Mirax* Haliday and *Rugosimirax* Ranjith & van Achterberg), despite their proposed diagnostic differences, all possess the current set of shared derived characters for Miracinae familiar to braconid taxonomists: antennal flagellomeres fixed at 12; maxillary palpal segments 5 and 6 fused so that palpi appear 4-segmented (ancestral segments 1 and 2 also fused as with many other braconids); wings with a distinctive reduced venation (Fig. 1B, D); and anterior metasomal tergites and laterotergites extensively desclerotized, leaving a y-shaped pattern of sclerotized bridges (see Fig. 1A, B, C). These genera do vary in a number of other features, including shape of apical flagellomeres, the presence or absence of notauli, and pattern (or absence) of some propodeal carinae. The generic boundaries as currently established no doubt need some further evaluation based on a broader view of the world fauna, which is gradually being explored more fully (Papp 2013; Ghramh et al. 2019; Slater-Baker et al. 2022, 2025; Ranjith et al. 2023; Liu and Polaszek 2024a, b, c, in press).

Here we report the discovery of two new Neotropical groups of Miracinae which both fall clearly outside the usual metasomal tergite morphology recognized as characteristic for Miracinae, and describe them as new genera, along with distinct species found within them. Nevertheless, these groups share all the other traits typical for Miracinae, so we assign them to Miracinae unambiguously. Clearly these groups ultimately require further analysis of their phylogenetic placement using molecular data, once suitable material of them is available. We describe them here to highlight them since their unusual morphology suggests a somewhat broader definition of the subfamily, as featured below.

As far as is known, all Miracinae are koinobiont endoparasitoids of leaf-mining and bark-mining Lepidoptera (Shaw and Huddleston 1991; Whitfield and Wagner 1991; Gadallah et al. 2022), and they carry bracoviruses that assist in parasitization (Wharton and Sittertz-Bhatkar 2002; Santos et al. 2022), although currently only species of *Centistidea* and *Mirax* have any associated host data. Two species have been recorded

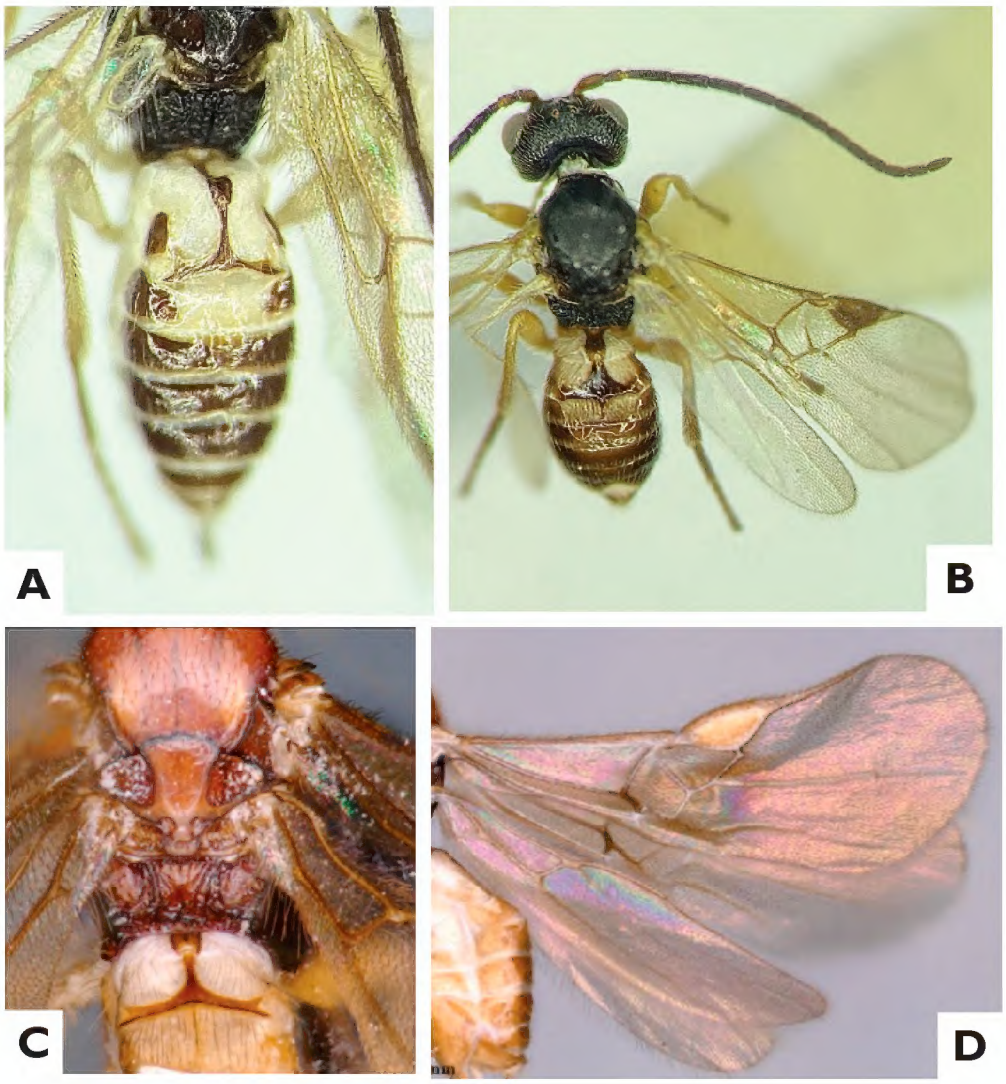

Figure 1. A *Centistidea* sp., female, CNC, dorsal view of metasoma **B** (different) *Centistidea* sp., female, CNC, dorsal habitus **C** *Rugosimirax expectata* Ranjith and van Achterberg, dorsal view of mesosoma and anterior portion of metasoma (modified slightly from Ranjith et al. (2023)) **D** *Rugosimirax expectata* Ranjith and van Achterberg, wings (modified slightly from Ranjith et al. (2023)).

as parasitizing a major pest, the coffee leaf miner, *Leucoptera coffeella* (Lepidoptera: Lyonetiidae) (Dantas et al. 2021), but are not extensively used in biological control.

Materials and methods

All specimens included in this study were found in the pinned collections of the Canadian National Collection of Insects, Arachnids and Nematodes in Ottawa (CNC). Specimens were examined using a Leica M205C and photographs were taken with a Keyence VHX-1000 Digital Microscope (Keyence Corporation, Japan), using a lens with a range of 10–130 ×; multiple images were taken of the structures through the focal plane and then combined to produce a single in-focus image using the software associated with the Keyence System. Fig. 1A, B were taken using an iPhone 11 positioned above the right ocular of a Leica M205C. Final images were corrected using GIMP 2.10.12. All plates were prepared using Microsoft PowerPoint 2010 and saved as .TIF files.

Morphological terminology generally follows Whitfield (1997), adapted to be consistent with the Hymenoptera Anatomy Ontology (http://portal.hymao.org/projects/32/public/ontology/) terms.

Descriptive taxonomy

The two genera below differ in metasomal morphology somewhat from the previously accepted diagnosis for Miracinae in the degree and pattern of desclerotization of anterior tergites and laterotergites, and in the shapes and sculpturing of the remaining sclerotized plates. They do not resemble each other in these differences, as will become clear below, and also exhibit several other unique combinations of features not found elsewhere in Miracinae. In particular, the delineation of Miracinae based on the y-shaped pattern of anterior metasomal sclerites as found in *Centistidea*, *Mirax* and *Rugosimirax* can no longer be sustained, although the separation of anterior metasomal spiracles onto the (mostly desclerotized) laterotergites, along with fixation upon 12 flagellomeres in the antenna and 4 maxillary palpal segments, as well as the characteristic reduced wing venation, still hold for all known Miracinae as defined here.

Key to world genera of Miracinae

1 Anterior metasomal tergites extensively desclerotized, leaving Y- or T-shaped sclerotized bridges ("skeleton") composed of elongate T1 and portions of T2+3 (Fig. 1A–C) **2**

– Anterior metasomal tergites less extensively desclerotized; T1, T2 and T3, if discretely defined, sculptured AND sclerotized bridges not Y- or T-shaped (Figs 2D, 3F, G, 4G, 5E, 7E) **4**

2 Propodeum anteriorly with longitudinal carinae on either side submedially but without medial carina (Fig. 1C); vein R1 of fore wing as long as or longer than pterostigma (Fig. 1D); notauli well marked, at least anteriorly (Fig. 1C) ..... ***Rugosimirax* Ranjith & van Achterberg**

– Propodeum either with longitudinal medial carina, at least anteriorly (Figs 1A, 3F, 6E), or without any longitudinal carinae; vein R1 of fore wing much shorter than pterostigma (Figs 1B, 3E, 6C); notauli variable, but often present only at extreme anterior end or indistinct (Figs 2E, 4D, 6D) **3**

3 Propodeum with longitudinal medial carina (Fig. 1A), at least anteriorly; sometimes also with transverse carinae ..... ***Centistidea* Rohwer** (as recognized by authors who treat it as separate from *Mirax*)

– Propodeum smooth medially, without longitudinal medial carina..... ..... ***Mirax* Haliday**

4 Metasomal T1–3 smooth and essentially unsculptured, but not desclerotized except laterotergites of T1 (Figs 2D, 3F, 3G) ..... ***Paramomirax*, gen. nov.**

– Metasomal tergites 2 and 3 fused into a sculptured syntergite resembling some tergites Microgastrinae (T1 still as in other Miracinae) (Figs 4G, H, 5E, F, 7E); T1–3 laterally extensively deslerotized but without medial desclerotized region (Figs 4G, H, 5E, F, 7E) ..... ***Fusimirax*, gen. nov.**

Paramomirax Whitfield & Fernandez-Triana, gen. nov.
https://zoobank.org/885778F6-B358-429A-A2D3-05920AF350CE

Remarks. As with the following new genus, *Paramomirax* shares with other Miracinae the antenna with flagellomeres fixed at 12, the proximal 1–3 of which have no placodes, the more distal ones possessing one rank of placodes, ancestral maxillary palpal segments 5 and 6 fused to reduce the number of segments to four, the characteristic reductions in wing venation (Figs 2C, 3E) and the medium-length ovipositor and sheaths and a sharp but evenly sclerotized hypopygium (Figs 2A, 3A, B), as well as the characteristics shared with other microgastroids (Mason 1981; Whitfield and Mason 1994) – the separation of the first metasomal spiracle in the lateral membrane or on a more or less well-defined laterotergite rather than laterally on the medial tergite. In Miracinae this membranous lateral area is usually at least partly strongly striate (Figs 1A–C, 2E, 3H). The possession of bracoviruses, and some modifications of the ovarioles to accommodate them (Whitfield and Mason 1994), are presumably also shared but not usually observable in preserved specimens.

The form of the anterior metasomal segments (desclerotization patterns, Y-shaped skeleton of remaining sclerotized tergites (Fig. 1A–C) typical for previously known Miracinae (as outlined by Mason (1981) and Whitfield and Mason (1994) and numerous descriptive papers by many authors) is profoundly different in *Paramomirax*, although in a different manner than in *Fusimirax*. In *Paramomirax*, tergites 2 and 3 are extensively although weakly sclerotized and externally smooth, with only the lateral portions of the first tergum strongly desclerotized, rather than mostly desclerotized (as in most Miracinae) with a transverse to broadly C-shaped narrow plate anterior to a desclerotized medial area covering (sometimes) the posterocentral area of T2 and (almost always) the anterocentral portion of T3 (Figs 2A, D, 3F, G). The outlines of the Y-shaped skeleton of tergites is vaguely suggested by darker areas in the cuticle, but these tergites are not clearly outlined (see Fig. 3F). The propodeum has a percurrent longitudinal medial carina (i. e., extending posteriorly beyond the transverse carina, unlike at least most *Centistidea*) and an angular transverse carina just past its midlength, often with some rugosity as well, but not always in the same areas. The ovipositor and sheaths are relatively long, roughly the length of the hind tibiae (again, unusual for Miracinae). The notauli are weakly indicated at best, and only anteriorly (Figs 2E, 3H).

The genus name makes reference to the high altitude paramo habitat of the type species, *Paramomirax peckorum* sp. nov., described below.

Paramomirax peckorum Whitfield, sp. nov.
https://zoobank.org/3421C0CA-BCE6-4ADB-ACCA-3AF0C1965690
Figs 2A–E, 3A–H

Type materials. ***Holotype.*** • Female, Colombia: Quindio, 21 km E. Calarca, 6-III-1974, 10,000', S. & J. Peck, CNC5342830. Deposited in Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa (CNC).

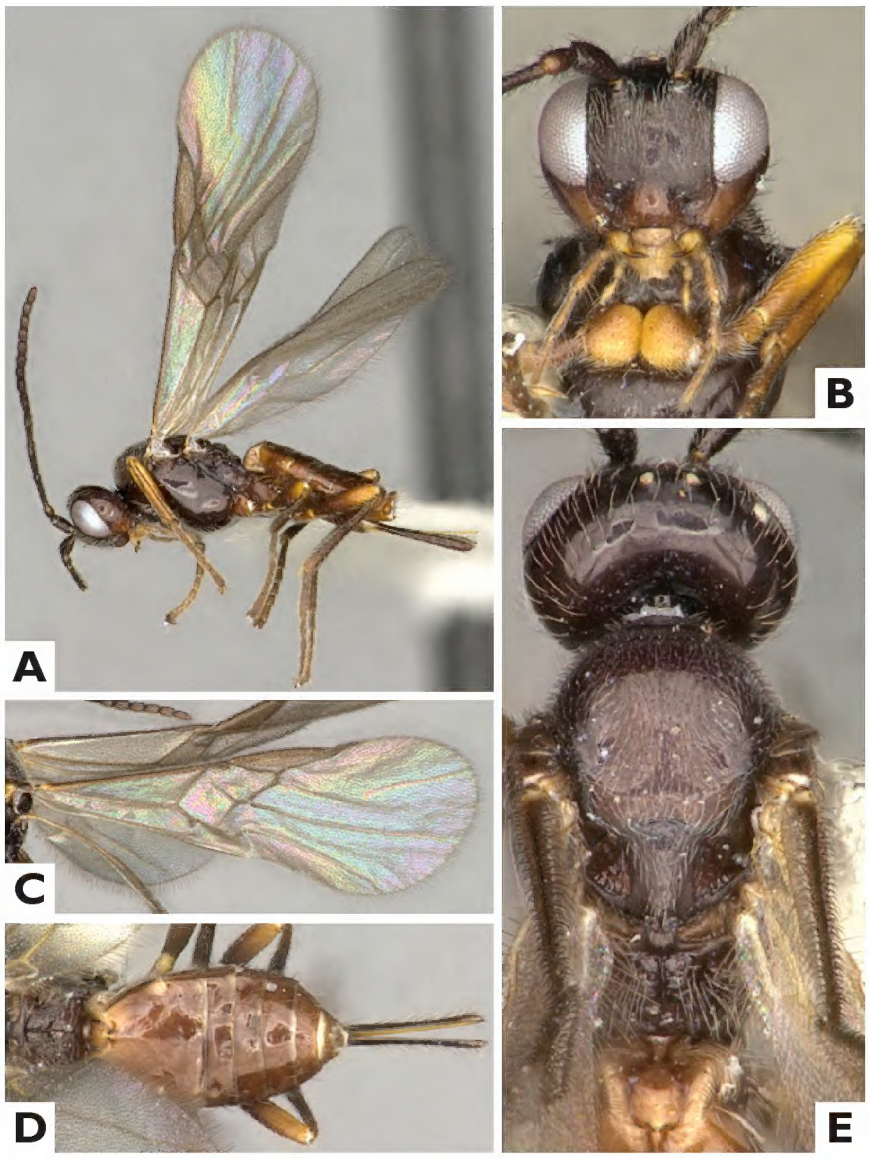

Figure 2. *Paramomirax peckorum* Whitfield, holotype female **A** lateral habitus **B** head and prothorax, anteroventral view **C** fore wing **D** propodeum and metasoma, dorsal view **E** head and mesosoma, dorsal view.

Paratype. • 1 female, same data as holotype, CNC5342831. Deposited in CNC.

Description. ***Size.*** Body length (excluding ovipositor) 2.3 mm; fore wing length 2.7 mm.

Coloration. Head and mesosoma black except lighter brownish lower genae; antenna black at extreme base (especially scape), pedicel distally and flagellum brown; mandibles and palpi pale brown to golden; legs proximally mostly dark brown, lightening distally on femora and most of tibiae, darker brown tarsi; pigmented parts of wing venation dark brown; metasoma fairly evenly deep brown dorsally, slightly lighter ventrally; ovipositor sheaths deep brown.

Morphology. Face indistinctly punctate, smooth medially; antennae slightly shorter than body, flagellomeres 8–11 only 1.2–1.3 × longer than wide; pronotum laterally with sharp but weakly impressed upper and lower grooves; mesoscutum shiny, very indistinctly punctate, with notauli very weakly indicated on extreme anterior face; scutellum convex, weakly punctate, slightly longer than anteriorly wide, subtriangular but with curved scrobe separating it from mesoscutum; mesopleuron mostly convex and shiny, without any clear central grooves; metanotum mostly sunken relative to shiny raised medial boss; propodeum weakly sculptured, with percurrent longitudinal medial carina, crossed by angular transverse carina at just past midlength; anterior tergite 1 (T1) narrow anteriorly, expanding

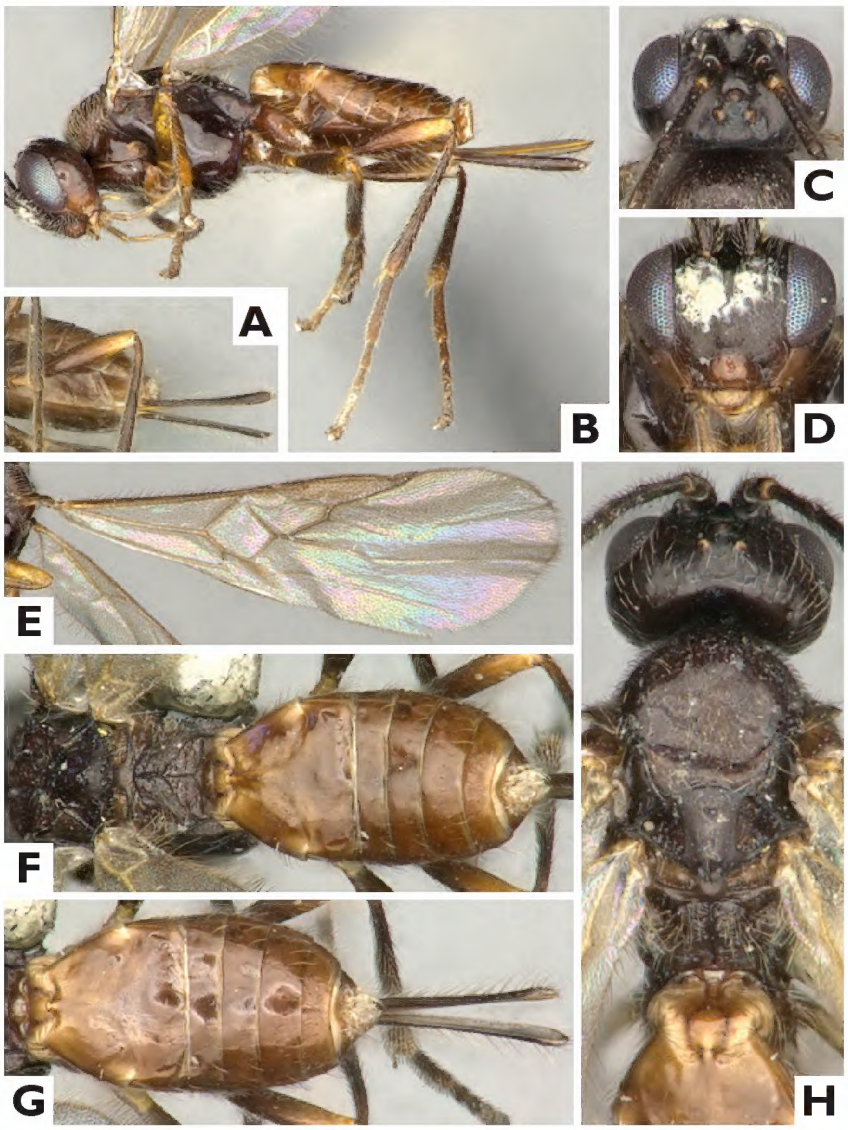

Figure 3. *Paramomirax peckorum* Whitfield, paratype female CNC5342831 **A** hypopygium and ovipositor mechanism, ventral view **B** lateral habitus **C** head, dorsal view D head, anterior view **E** fore wing **F** mesosoma and metasoma, dorsal view **G** metasomal and ovipositor mechanism, dorsal view **H** head, mesosoma and anterior metasomal tegite 1, dorsal view.

into elongate oval posterior 0.75; laterotergal region of T1 pigmented light brownish but sclerotized and strongly striate; T2 and T3 shiny, smooth and evenly sclerotized; typical miracine Y-shaped structure visible only as slightly differently colored areas hidden beneath cuticle; laterotergal regions of T2 and T3 evenly sclerotized as on dorsal parts.

T4 evenly sclerotized and shiny, similar to T2+3; hypopygium evenly sclerotized, darker distally, somewhat acuminate but with blunt tip; ovipositor nearly straight, sheaths as long as hind tibiae and setose over entire distal 0.75.

Male. Not known.

Variation. Only two very similar females from the same locality are known.

Distribution. Only one locality so far, in paramo vegetation over 3,000 m.

Biology. Not known, but host presumed to be a small leaf-mining caterpillar as with other Miracinae.

Notes. This species has by far the fewest desclerotized regions of the anterior metasoma, and the longest ovipositor, of any miracine yet discovered. It is also one of the largest (roughly 10–20% larger than average).

Etymology. The specific epithet is meant to honor the collectors, Stewart and Jarmila Kukalova-Peck.

Fusimirax Whitfield & Fernandez-Triana, gen. nov.
https://zoobank.org/59780255-D362-46C8-B9A4-6D27606BDFE8

Remarks. As with the above new genus, *Fusimirax* shares with other Miracinae the antenna with flagellomeres fixed at 12, maxillary palpal ancestral segments 5 and 6 fused to reduce the number of segments to four, the characteristic reductions in wing venation (Figs 4C, 5D, 6C, 7C) and the medium-length ovipositor and sheaths and a sharp but evenly sclerotized hypopygium (Figs 4F, 5A, 6A), as well as the characteristics shared with other microgastroids (Whitfield and Mason 1994)) – the separation of the first metasomal spiracle in the lateral membrane or on a more or less well-defined laterotergite rather than laterally on the medial tergite. In Miracinae this membranous lateral area is usually at least partly strongly striate, and this is the case with *Fusimirax*. The possession of bracoviruses, and some modifications of the ovarioles to accommodate them (Whitfield and Mason 1994), are presumably also shared but not usually observable in preserved specimens.

The form of the anterior metasomal segments (desclerotization patterns, Y-shaped skeleton of remaining sclerotized tergites (Fig. 1A–C) typical for previously known Miracinae (as outlined by Whitfield and Mason (1994) and numerous descriptive paper by many authors) is profoundly different in *Fusimirax* also, although in a different manner than in *Paramomirax*. In *Fusimirax*, tergites 2 and 3 are fused into a sclerotized and coarsely sculptured syntergite as in some Microgastrinae, rather than a transverse to broadly c-shaped narrow plate anterior to a desclerotized medial area covering (sometimes) the posterocentral area of T2 and (almost always) anterocentral portion of T3. The boundary between T2 and T3 is usually indicated at least laterally by a weak groove that often disappears medially. The propodeum has a percurrent medial carina (i. e., extending posteriorly beyond the transverse carina, unlike at least most *Centistidea*) and an angular transverse carina just past its midlength, often with some rugosity as well, but not always in the same areas. In a few specimens the medial carina splits at some point to form a small narrow areola-like area within it. The ovipositor and sheaths are relatively short, half the length of the hind tibiae at most. The notauli are distinct but only extend over about the anterior third of the mesoscutum.

The genus name makes reference to the fusion of T2 and T3 into an obvious syntergite.

Key to the known species of *Fusimirax* Whitfield & Fernandez-Triana

1 Mesoscutum light orange-brown, contrasting with darker mesosomal regions (Fig. 4H) .....***Fusimirax masneri*** **Whitfield & Fernandez-Triana, sp. nov.**

– Mesoscutum dark brown to black, concolorous with other mesosomal regions (Figs 5F, 6F) **2**

2 Syntergite of T2+3 less than 2 × as long as width at posterior end, surface roughly rugose with weak overlay of longitudinal sculpture (Fig. 5E, F) ....***F. robusta*** **Whitfield, sp. nov.**

– Syntergite of T2+3 slightly greater than 2 × as long as width at posterior end, surface coarsely longitudinally carinate (Fig. 7E)..... .....***F. gracilis*** **Whitfield, sp. nov.**

***Fusimirax masneri* Whitfield & Fernandez-Triana, sp. nov.**
https://zoobank.org/AABAFB8-B046-49AD-9F09-D9323C40FA48
Fig. 4A–H

Type materials. ***Holotype.*** • Female, Dominican Republic: Barahona Sra. Bahoruco, Loma Remigio, 800 m, cloud forest III-1991, L. Masner, CNC5342832 (CNC).

Paratypes. None.

Description. ***Size.*** Body length 2.0 mm; fore wing length 2.2 mm.

Coloration. Head dorsally bark brown, shading to much lighter ventrally; especially clypeus; mouthparts and palpi pale yellowish; scape and pedicel yellowish, remainder of antenna brown; mesosoma anteriorly (pronotum and propleuron, dorsal portion of mesopleuron, tegulae and mesoscutum) light yellow-brown, remainder darker brown; legs all pale yellowish; pigmented portions of wing venation pale brownish, including pterostigma; metasoma anteriorly with whitish laterotergites and lateral edges of T2/T3 syntergite; T1 and most of syntergite dark brown; T4 and succeeding terga paler brown; ovipositor sheaths darker brown, especially distally.

Morphology. Face very weakly and indistinctly punctate throughout; raised medially; antennae slightly longer than body, slender, with even distal flagellomeres at least twice as long as broad; propleuron with dorsal groove weakly crenulate, ventral groove broad, arcuate and smooth; mesoscutum weakly sculptured, with clear notauli over anterior 0.4 of its length (Fig. 4D, H); scutellum smooth, weakly convex, longer than broad, roughly thimble-shaped; mesopleuron polished, convex, without central grooves; metanotum deeply sunken except raised medial boss; propodeum relatively smooth, with strong percurrent longitudinal medial carina and hints of an angled transverse carinae just past midlength; T1 slender, narrow anteriorly, expanding to rounded tip, with raised medial portion; laterotergal region of T1 white, desclerotized, with central striate region; T2 and T3 fused into elongate sculptured syntergite, strongly expanded at T2/T3 border, sculptured region of T3 slightly broader than T2; laterotergal regions of T2 and T3 white (along with edges of syntergite), with some of surface striate; T4 weakly but evenly sclerotized, translucent; hypopygium evenly sclerotized and strongly triangular, with acute sharp distal tip; ovipositor nearly straight, sheaths half as long as hind tibiae and sparsely setose over expanded portions (Fig. 4F).

Male. Not known.

Variation. Only one female specimen available.

Distribution. So far, only one locality at 800 m in the Dominican Republic. The label says "cloud forest", but this seems probably not quite accurate based on the locality and elevation.

Biology. Not known, but host presumed to be a small leaf-mining caterpillar as with other Miracinae.

Notes. The strikingly colored mesoscutum and metasoma combination is unique.

Etymology. The specific epithet honors the great hymenopterist Lubomir Masner, the collector who sampled in the Dominican Republic over multiple years.

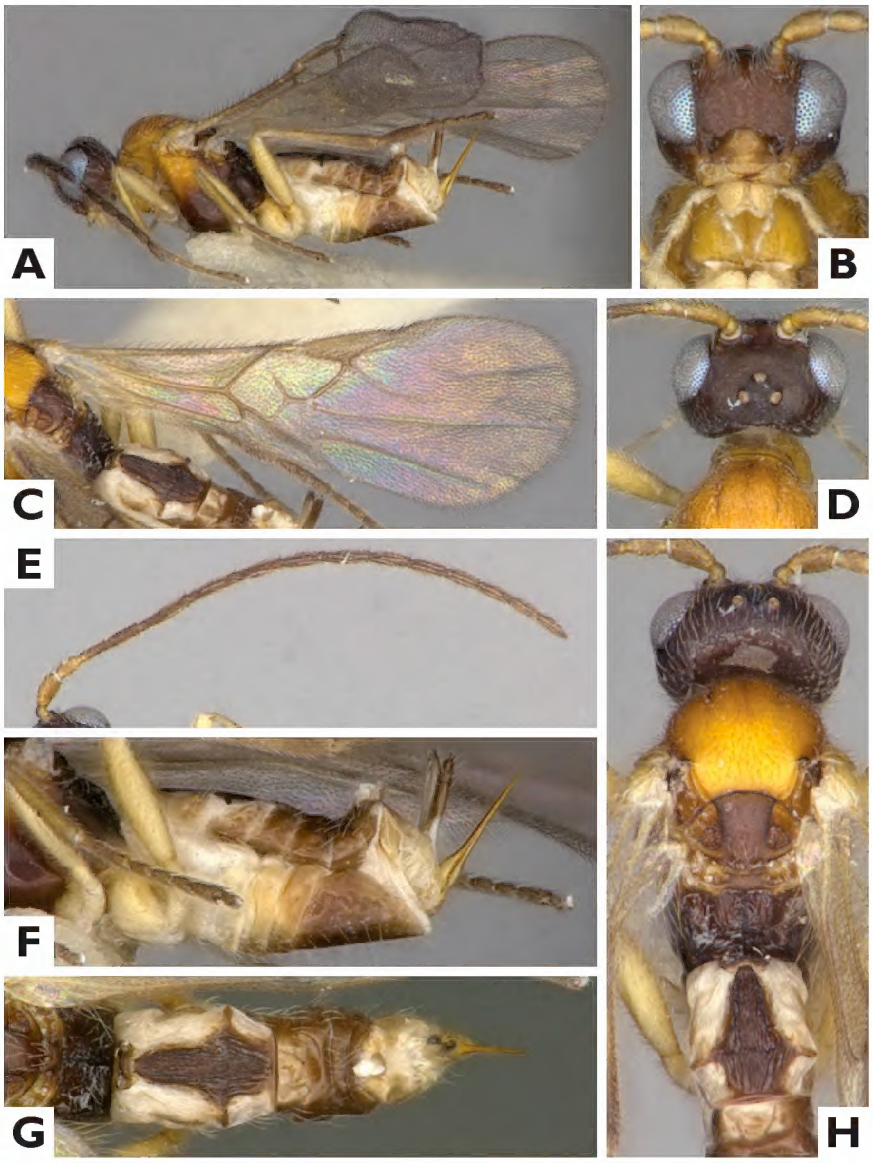

Figure 4. *Fusimirax masneri* Whitfield and Fernandez-Triana, holotype female **A** lateral habitus **B** head and prothorax, anteroventral view **C** fore wing **D** head and anterior of mesonotum, dorsal view **E** antenna **F** metasoma and ovipositor mechanism, lateral view **G** propodeum and metasoma, dorsal view **H** head, mesosoma and anterior of metasoma, dorsal view.

***Fusimirax robusta* Whitfield, sp. nov.**
https://zoobank.org/7955A6E7-714D-4AB9-B308-EFA4B990D540
Fig. 5A–F

Type materials. ***Holotype.*** • Female, Dominican Republic: Barahona Sra. Bahoruco, Loma Remigio, 800 m, cloud forest III-1991, L. Masner, CNC5342833 (CNC).

Paratypes. None.

Description. ***Size.*** Body length 1.9 mm; fore wing length 2.1 mm.

Coloration. Head, mesosoma (except lighter brown pronotum and propleuron) and metasomal syntergite dark brown to blackish, posterior segments of metasoma lighter brown; scape light yellow-brown; remainder of antenna dark brown; mandible light brown, palpi pale yellowish; legs entirely light yellow-brown; tegulae and pigmented parts of wing venation including pterostigma light brownish; laterotergites of T1 and T2 almost white, contrasting with dark syntergite; ovipositor sheaths deep brown.

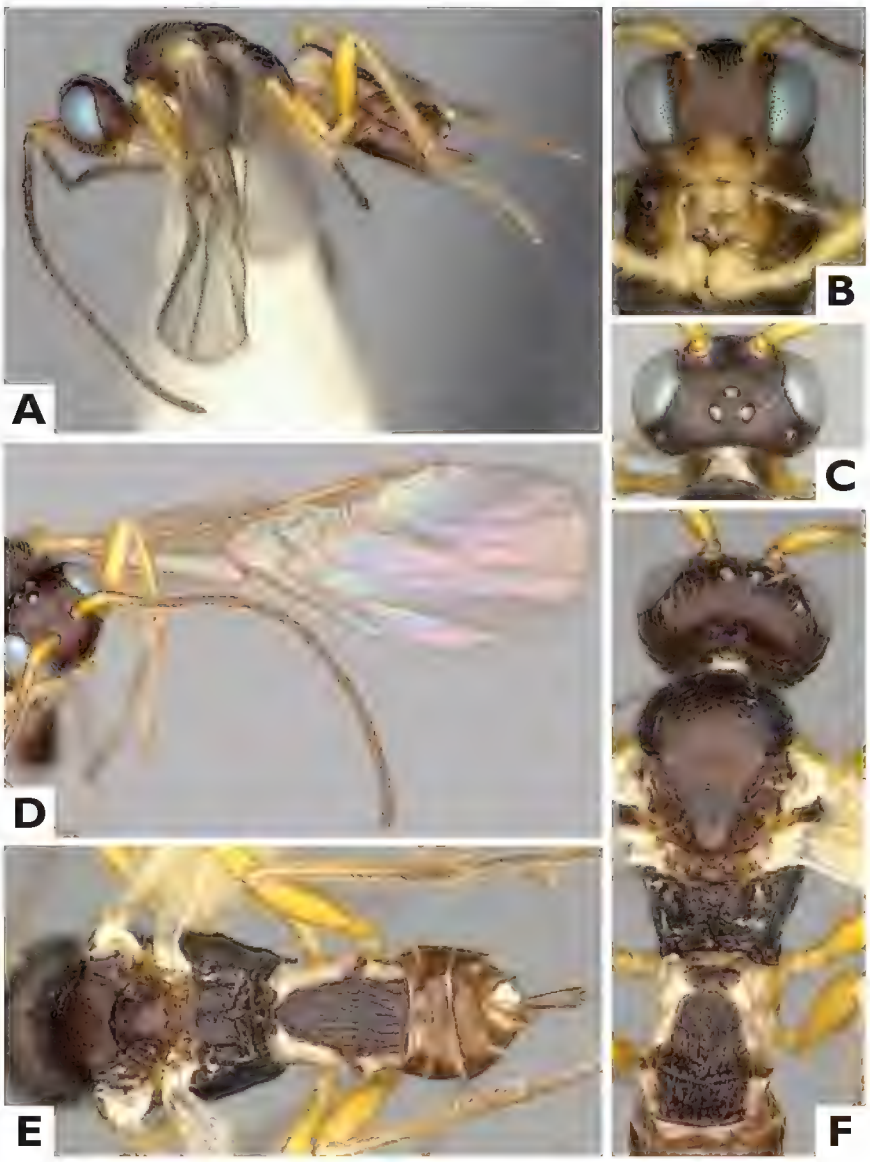

Figure 5. *Fusimirax robusta* Whitfield, holotype female **A** lateral habitus **B** head and prothorax, anteroventral view **C** head, dorsal view **D** fore wing **E** dorsal habitus **F** head, mesosoma and anterior of metasoma, dorsal view.

Morphology. Face smooth, with raised medial ridge; antennae slightly longer than body, with apical flagellomeres roughly twice as long as broad; propleuron with dorsal and ventral grooves represented by very fine and poorly impressed lines; mesoscutum with satiny reflections and distinctly punctate over most of surface except posterolateral corners; notauli indistinct, even anteriorly; scutellum polished and raised centrally, weakly convex, clearly longer than anteriorly broad; mesopleuron weakly roughened, convex, with slight weak depression centrally but no obvious grooves; metanotum mostly sunken, with some abortive cross-ridges but raised medial boss not extending to anterior edge; propodeum finely sculptured, with percurrent longitudinal medial carina splitting at midlength to produce a small elongate areola-like structure, met laterally by angled transverse carinae; T1 narrow anteriorly, widening to elongate-oval raised broader posterior end with some sculpturing; laterotergal region of T1 whitish, with central area of striation; T2 and T3 fused into elongate sculptured syntergite; T2 portion bell-shaped (wider posteriorly) with lateral flanges at grooved T2/T3 junction; T3 roughly parallel-sided; laterotergal regions of T2 and T3 whitish, with some striations; T4 less strongly sclerotized and smooth; hypopygium evenly sclerotized and

subtriangular with sharp tip; ovipositor nearly straight; sheaths roughly half as long as hind tibiae with setae over distal half.

Male. Unknown.

Variation. Only one female known.

Distribution. Same locality as *F. masneri* (see remarks there).

Biology. Not known, but host presumed to be a small leaf-mining caterpillar as with other Miracinae.

Notes. The shape of the syntergite is diagnostic, and the propodeal carinae are unique as well.

Etymology. The epithet "robusta" refers to the anterior metasomal syntergite shape, not to the overall body shape, which is perhaps only slightly more robust than the other species.

***Fusimirax gracilis* Whitfield, sp. nov.**
https://zoobank.org/266FFF05-A392-4221-AF02-3B34AAA7282B
Figs 6A–F, 7A–F

Type materials. ***Holotype.*** • Female, Dominican Republic: Rancho Arriba, 26-III-1978, 400 m, L. Masner, CNC5342834 (CNC).

Paratypes. • 3 males, Dominican Republic: Baharona, 4 km N. Paraiso, 150 m, 22-III-91, L. Masner, CNC5342835, CNC5342836, CNC5342837; • 2 males, Dominican Republic: Colonia, Cord. Central, 1000 m, 25-III-1978, L. Masner (LM), CNC5342838, CNC5342839. All deposited in CNC.

Description. ***Size.*** Body length 1.6 mm; fore wing length 1.7 mm.

Coloration. Head, mesosoma (except lighter brown propleuron) and metasomal syntergite dark brown, T1 light yellowish and posterior segments of metasoma lighter brown; mandibles and palpi pale yellowish; scape pedicel and proximal two flagellomeres pale yellow-brown, remaining flagellomeres shading gradually to very slightly darker brown at distal end of antenna; legs entirely pale yellow-brown; tegulae and pigmented portions of wing venation (including pterostigma) very pale yellow-brown; laterotergites of T1 and T2 whitish; entire venter of metasoma very pale except slightly darker anterior half of hypopygium; ovipositor sheaths pale yellow-brown.

Morphology. Face rather smooth, convex to a weak ridge medially; antennae slightly shorter than body, slender, with apical flagellomeres about 2 × as long as broad; propleuron with smooth dorsal and ventral grooves joined together posteriorly by another smooth groove; mesoscutum with satiny reflections and sparsely but distinctly punctate except smoother posterior margin; notauli poorly defined but extending over anterior half; scutellum smooth, nearly flat and longer than broad; mesopleuron very faintly sculptured, with poorly-defined groove/depression centrally; metanotum mostly deeply sunken, with abortive cross-carinae and medial boss raised only over posterior half; propodeum weakly sculptured, with percurrent longitudinal medial carina crossed by distinct angled transverse carinae

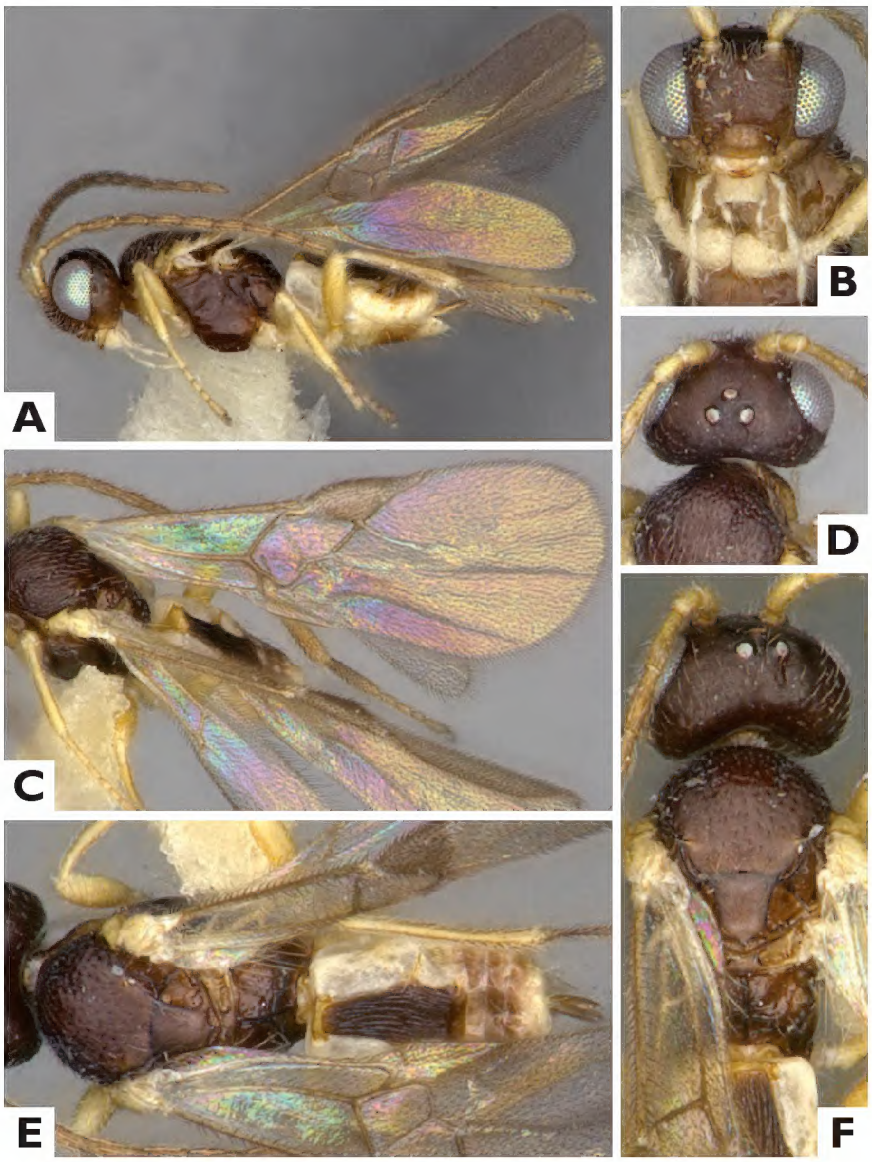

Figure 6. *Fusimirax gracilis* Whitfield, holotype female **A** lateral habitus **B** head and prothorax, anteroventral view **C** fore wing **D** head and anterior of mesonotum, dorsal view **E** mesosoma and metasoma, dorsal view **F** head and mesosoma, dorsal view.

just past midlength; T1 very narrow and elongate, abruptly broadening at posterior end to meet T2; laterotergal region of T1 strongly whitish, with central striation; T2 and T3 fused to form longitudinally sculptured elongate syntergite which broadens gradually to T2/T3 flared and weakly grooved junction, parallel-sided over T3; laterotergal regions of T2 and T3 whitish, with some regions of striation; T4 evenly sclerotized but weakly pigmented and translucent; hypopygium evenly sclerotized to fairly sharp tip; ovipositor nearly straight; sheaths less than half as long as hind tibiae with setae over distal half.

Male (Fig. 7A–F). This is the only species of *Fusimirax* for which there are males known (five specimens). These tend to be significantly more lightly colored over much of the body, sometimes with relatively broader syntergites (lower elevation specimens). T4 is also medially partially desclerotized, only in males.

Variation. As described above for males.

Distribution. So far known only from Dominican Republic, but extending from 150 m to 1000 m elevation, thus overlapping elevationally with the other species of this genus.

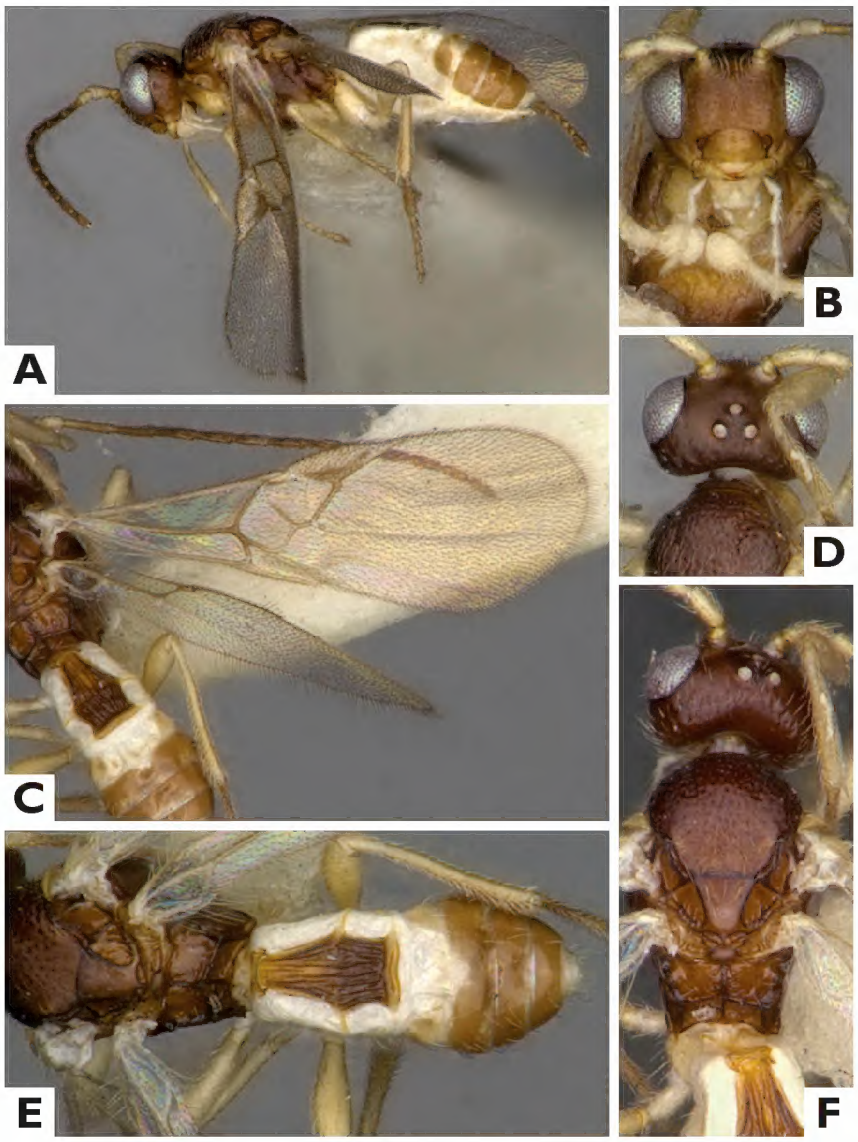

Figure 7. *Fusimirax gracilis* Whitfield, paratype male CNC5342838 **A** lateral habitus **B** head and prothorax, anteroventral view **C** wings **D** head and anterior of mesonotum, dorsal view **E** mesosoma and metasoma, dorsal view **F** head, mesosoma, dorsal view .

Biology. Not known, but host presumed to be a small leaf-mining caterpillar as with other Miracinae.

Notes. Based on available material, this may be the most common *Fusimirax*, but we have so few overall that it would be difficult to extrapolate much.

Etymology. The specific epithet "gracilis" refers to the small and delicate body of these wasps, especially pronounced in this species but true to some extent for most Miracinae.

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